VIRTUAL REALITY FOR PHYSICS EDUCATION

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Virtual reality (VR) has reached a point of development where its accessibility and immersion is sufficient to give realistic and memorable experiences. One of the most exciting possibilities is the ability to visualise invisible or impossible worlds. For example, electricity and magnetism are frequently challenging concepts to teach, in particular because students need to build a mental model of what a 'field' is. VR gives us the ability to give people a realistic representation of vector fields, of far higher complexity than that possible on a traditional computer screen. Furthermore, it can allow dynamic manipulation, simulation, and testing – effectively offering students a sandbox in which to experiment with these systems.

Another exciting application is the use of VR to allow students to experience worlds that manifest their misconceptions. Led by misconceptions well studied and measured using the Force Concept Inventory (Hestenes, Wells, & Swackhamer, 1992), students can be asked to predict what forces exist in a given situation. They are then given a world in which those forces are present, and thus if incorrect, experience a situation that behaves counter-intuitively, thereby triggering cognitive dissonance. They can then be guided via narration, or an instructor to reassess their views and ideally correct their misconception.

At ANU, we have been developing both of these apps over the last two years. We will share some positive preliminary results with small groups of student, both qualitative and quantitative.

REFERENCE
Hestenes, D., Wells, M., & Swackhamer, G., (1992) *The Physics Teacher*. 30, p. 141.